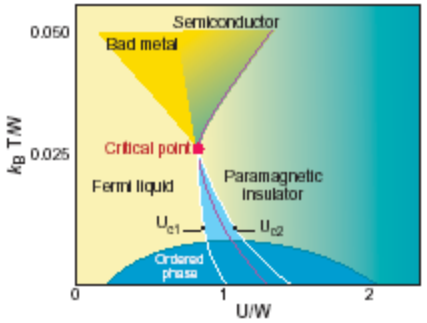
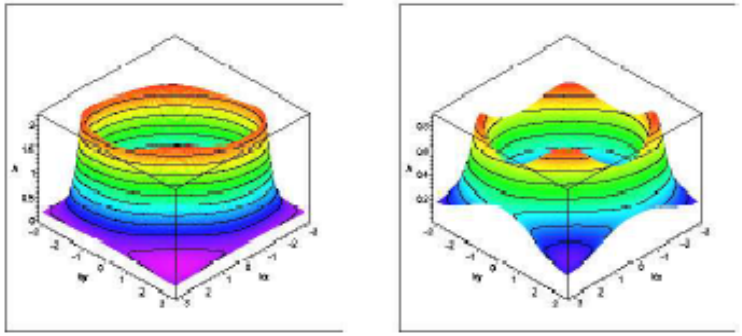
Dynamical Mean Field Theory Studies of the Mott Transition

Olivier Parcollet, Giulio Biroli and Gabriel Kotliar, Rutgers University, NSF DMR-0096462

The Mott transition, namely how the electron evolves from being wave-like and conducting to being particle-like and insulating as a function of a control parameter such as pressure (denoted by U/W in Fig. 1) is a central problem in materials theory. It is relevant to materials as diverse as kappa organics, and vanadium oxides. The dynamical mean field theory, a new method, developed thru NSF support, is giving new insights into this problem, as summarized in Fig. 1. Cluster DMFT studies revealed that as the critical endpoint is approached the distribution of spectral intensity acquires a d wave anisotropy (cond-matt 0308577) as shown in Fig2.



DMFT Schematic phase diagram of a material undergoing a pressure driven Mott transition. Science 302, 67 (2003)



Evolution of the distribution of low energy spectral intensity as the Mott transition is approached. (left curve fermi liquid), right curve within 5 % of the Mott endpoint.